

Testimony of Bruce W. MacDonald

Before the Strategic Forces Subcommittee
House Armed Services Committee
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Madame Chairman, Ranking Member Turner, and members of the Subcommittee, I am privileged to testify here today on the vital issue of space and U.S. security. I am speaking purely in a private capacity, and my comments do not necessarily represent the views of the Congressional Commission on the Strategic Posture of the United States, the U.S. Institute of Peace, or the Council on Foreign Relations.

This subcommittee has posed three excellent questions for this hearing:

1. Do we have the right national policy to ensure the security of our space assets, particularly those supporting the warfighter and national intelligence collection? My short answer is that at best our policy is deficient in doctrine and strategy and needs serious and timely attention if we are to avoid major problems.
2. Do we have the right investment strategy for protecting and defending critical space assets and capabilities? Briefly, based on the public statements of the last few years, and the private credible complaints of insiders, I have at best only modest confidence in the adequacy of our current investment strategy for protecting our space assets. There is little unclassified information available on this issue, and therein lies a problem: how can Congress and others assess and provide responsible oversight and opinion in such an information vacuum?
3. What role can diplomacy play in ensuring the security of our space assets? I believe diplomacy has a vital supporting role to play, much more than we have exercised in the past, but it cannot by itself solve our space security problems.

I elaborate on these answers below, with the theme that there is much we should know and understand, but do not, about this new space-enabled military era we have recently entered.

Introduction and Overview

While America has been a space-faring nation for over 50 years, the essential and growing role that space plays as a foundational feature in our conventional military superiority, our strategic nuclear strength, and our civilian economy is too little understood. The rivers of information and other services our space assets provide allow our military decision-making and weapons to be far more effective than in the past, vital advantages across the spectrum of potential conflict. It is no wonder that current U.S. space policy for the first time calls our space assets “vital to our national interests.”

Yet more serious than this lack of public understanding about space is the serious shortfall in understanding within the military space community of the larger implications of this space importance. The threats to our space assets, and hence to our vital national interests, come in many forms, some hostile, some not. One of the biggest threats we face is what we just don’t

know: about objects in space, the intentions of those who put them there, and the very strategic landscape of space itself – how it operates, where it poses strategic dangers, and what we need to look out for. And this is dangerous.

The Strategic Problem

Our overall goal should be to shape the space domain to the advantage of the United States, and to do so in ways that are stabilizing and enhance U.S. security. The U.S. has an overriding interest in maintaining the safety, survival, and function of its space assets so that the profound military, civilian, and commercial benefits they enable can continue to be available to the United States and its allies.

These vital space assets face three forms of threats, all of them worrisome and growing:

- 1) With the proliferation of space and other technologies, and specifically with the anti-satellite (ASAT) capability China demonstrated two years ago, there is a risk that China or another adversary could exploit this fast-growing U.S. dependence on space in a war to greatly weaken U.S. military and economic power. China could do so and thus pose a serious threat to U.S. space assets within a decade if it chose to do so. China is also pursuing other programs that have important ASAT implications, and other nations are interested in ASAT as well. The 2008 U.S. shoot-down of an errant satellite demonstrated the ASAT capability inherent to missile defense systems, ours and others. Last week Russia indicated renewed interest in ASAT weapons when their deputy defense minister, General Valentin Popovkin, stated that Russia is working on ASAT.
- 2) Space “traffic” is heavier than it has ever been and getting worse, both in terms of physical vehicles and communications. Yet there is no “FAA for space” and even just the monitoring, much less the management, of space objects is widely seen as far less than needed. There is a great need for space traffic management capabilities, including enforceable rules of the road, codes of conduct, and space situational awareness that would inform a “space FAA” management capability.
- 3) Space debris poses an insidious and growing threat to all space assets. Debris in space does not quickly fall to the ground, as on earth; at all but the lowest orbits, debris can stay aloft for centuries and more. In addition to the 17,000 orbiting objects the Air Force can track, there are hundreds of thousands of potentially lethal objects in orbit, and millions of smaller objects that pose at least some risk. The recent collision between a U.S. Iridium satellite and an old Russian Cosmos dramatically illustrated the problem.

Our space assets are exposed and fragile. They can’t run, they can’t hide, and today they can’t defend themselves. One small object traveling at orbital speeds can destroy them. Unless we take proactive measures, all these threats will grow, and we must bear in mind that the U.S. depends more on space than our potential adversaries. If we are not careful, the way we are currently thinking, planning, and investing, our space capabilities may only be available in peacetime, or against non-peer adversaries. We could lose them just when we need them most. At a minimum, we need far greater space situational awareness and space intelligence (SSA/SI) capabilities than today. Responsible officials have been saying this for years, but SSA/SI has never received the priority it deserves. If this fails to change, we can

expect more frequent space collisions and growing instability in space.

I will focus on the hostile threat dimensions of our overall military space challenges, though orbital debris and space traffic management also deserve priority attention.

Current U.S. Space Policy Raises but Does Not Answer Key Space Stability Issues

In 2006, the Bush Administration issued a revised space policy that declared for the first time that U.S. space assets are a “vital national interest,” in recognition of the extraordinary and growing U.S. military and economic dependence on them. The phrase “vital national interest” carries much heavier national security implications than has ever been attributed to space. This policy also reserves the right to deny adversaries “the use of space capabilities hostile to U.S. national interests.” But attacking others’ space capabilities invites attacks on our own, which our policy calls a “vital national interest,” and on which we depend far more than anyone else. Evolving technology guarantees both that: 1) we will depend even more on these assets in the future; and 2) these vital assets will likely face greater threats than today.

This dimension of U.S. space policy is contradictory: why would we want to threaten actions that would invite retaliation against “vital national interests,” and where we have more at stake than our adversaries? This contradiction was never explained. Such a policy contradiction could make sense if:

- the governing U.S. space force doctrine is deterrence -- that we would have offensive capability strictly to deter attacks on our assets, and we would not initiate them – but there is no indication that this is the case; or
- the U.S. could maintain space dominance, which the policy tacitly implies, but such a posture would not be sustainable; or
- such attacks were limited and localized, i.e., tactical, not strategic, though there would be serious risks of escalation.

There is an inherent risk of strategic instability when relatively modest defense efforts create disproportionate danger to an adversary, as with space offense. And there is a serious risk of crisis instability in space when “going first” pays off – destroying an adversary’s satellites before he destroys yours. We don’t know what would happen in a crisis, but the potential for space instability seems high and likely to grow. But our policy is silent on this.

I believe the United States can and should remain pre-eminent in space, but that we are currently being incautious in some dimensions of our military space policy due to the absence of both a clearly thought-out space doctrine and a coherent national security space strategy. Many issues are begging to be addressed, including:

- How does deterrence function in space? Could limited counterspace attacks remain limited, or would they inevitably escalate into all-out space conflict?
- How can countries with less to lose in space than we be deterred? Are there asymmetric means available to us for deterrence?
- Is space deterrence possible without offensive space capabilities? If so, how? If not, what kinds of capabilities are most stabilizing?

- What U.S. space strategy, and resulting acquisition strategy, in that order, would promote U.S. security interests and reduce space instability over the longer term?
- How do China, Russia and others see space stability? How will this shape China's space doctrine, acquisition, strategies, and diplomacy?

We don't know the answers to these questions, and we are doing far too little to answer them. The United States needs a stabilizing space protection strategy that would:

- Focus on stability, deterrence, escalation control and transparency
- Incentivize nations to avoid destabilizing, irreversible actions in space
- Provide a U.S. military space architecture with "defense in depth" and terrestrial, airborne, and other backups to assure availability of key space services in the event of space outages from whatever causes, benign or hostile
- Reduce adversary incentives and ability to target U.S. space capabilities
- Maintain "strategic ambiguity" over our responses to adversary actions
- Encourage agreements that constrain the most destabilizing dimensions of space competition and provide ground rules for normal space operations; and
- Expand dialogue among U.S., China, and others to promote better understanding and reduce chances for misunderstanding and miscalculation, always dangerous in a crisis

Creating a stable space domain requires the United States to respond to space threats in a responsible manner, one that ideally does not provoke other nations to greater counter space efforts than they would otherwise pursue. The United States must be careful to avoid creating a self-fulfilling prophecy and should refrain from activities and public communications (such as an Air Force advertisement describing space as a future battleground) that invite the buildup of other nations' counterspace capabilities. The United States should proceed cautiously with offensive counterspace initiatives. We must recognize that other nations depend less on space than we and, therefore, the destruction of their space capabilities is of lesser relative value to us as long as this is true.

China and Space Conflict

There is a sizable Chinese military (PLA) literature on space conflict, but it is unclear how well this reflects Chinese government thinking, any more than U.S. military journals reflect official U.S. policy. However, China's ASAT test and this literature demonstrate a PLA awareness of the importance of offensive counterspace (OCS) capabilities and suggest that such capabilities are part of China's larger plans for the future. It is also unclear whether this reflects PLA interest in OCS for warfighting or just for deterrence.

Should China choose to deploy its demonstrated ASAT system, or a more advanced versions of it, U.S. space assets and the military and economic infrastructures they support will be in jeopardy. Furthermore, China reportedly has other offensive space programs under development, including lasers, microwave- and cyber-weapons. We also face the twin realities that defending space assets is more difficult than attacking them; and while advancing technology will help both defense and offense, the offense is likely to benefit more. **One thing is certain – more clarity on PLA and Chinese government thinking on**

space deterrence, doctrine, space stability, and related issues – and Russian thinking, too -- are urgently needed and are important to U.S. security.

Should the U.S. Have Offensive Space Capabilities?

This is a question that lends itself to simplistic answers on both sides of the question. If it is possible to establish a space regime where no one had offensive space weapons, we should certainly do so. If we can maintain space deterrence by other than offensive means, we should certainly do so. We must think long and hard before we deploy a major offensive space capability. But if there are no feasible alternatives, then we should develop a limited offensive capability, in a deterrence context. Limited, tactical applications may also be possible but must be fully understood first.

The U.S. and China have already crossed a space Rubicon of sorts. ASAT capabilities already developed cannot be un-invented, and missile defense, with inherent ASAT capabilities, is here to stay. This is reality. U.S. security crucially depends on space and will do so even more in the future, and such capabilities must be preserved. Defensive steps can help, but ultimately it is difficult to protect space assets. We also can and should decentralize our space assets, putting our space eggs in more baskets to reduce our vulnerability, which would help, but likely not resolve, our problem. Arms control and other diplomatic steps certainly have a larger role to play and can help limit some of these threats. But verification issues make a comprehensive diplomatic-only solution seem improbable at present, which means the U.S. may need at least some offensive space capabilities, though we should tread carefully and thoughtfully into this new, highly uncertain world. We need to know where the pitfalls are, and not just develop space weapons now and worry about the implications later. The real question is what kind and level of offensive capability might we need, and to what purpose? Any offensive space capability should have at least seven characteristics:

1. Effectiveness – they should be able to negate hostile space assets to differing levels.
2. Temporary and reversible effects – the space targets should not be permanently destroyed, only rendered ineffective during the conflict.
3. Survivability – the systems themselves should be largely invulnerable to attack, and thus stabilizing in a crisis, which would tend to favor ground-based systems.
4. Cost-effectiveness – it should be cheaper to add a unit of offense than for the adversary to defend against it.
5. Resilience – systems should be capable of performing in multiple scenarios.
6. Credibility – systems must appear credible to an adversary. A space nuclear burst would be a very effective ASAT, but it would be so damaging to U.S. space assets that it would have no credibility as a U.S. weapon.
7. Minimal collateral damage – systems should have little/no effect on other satellites.

We should not seek offensive counterspace capability at the expense of effective steps to protect U.S. space capabilities. We must be very careful, if we acquire offensive capabilities, to do so in a manner that other nations will find as unthreatening as possible. Otherwise, we could create a self-fulfilling prophecy: as nations like China or Russia see evidence of U.S. attempted space hegemony, they would accelerate their own efforts, just as we would if the roles were reversed. Above all, we want to avoid the space policy and doctrinal near-vacuum

we currently are in, where our space technology seems to shape our policy, rather than our policy shaping technical solutions.

Space Pre-Eminence, Not Dominance, Should Be the U.S. Objective

It would be unwise for the United States to seek space dominance. There are many ways to attack space assets, and it is easier and cheaper to attack than to defend them, which would likely frustrate any sustained attempt at dominance and leave us worse off than we are now. In trying to maintain dominance, we would be at the mercy of unpredictably advancing space technologies that could favor China or others as well as us. In the face of likely Chinese and other resistance to such a provocative posture, we would constantly be trying to stay ahead technologically to maintain this dominance, demanding large expenditures. It would also be very unstable, especially if China achieved a breakthrough that threatened our dominance.

Rather than dominance, a posture of space pre-eminence would seek to assure that the U.S. is the clear space leader, a non-hegemonic “best-in-class” posture with more advanced space capabilities than other countries. We would continue to derive substantially more military and economic benefit from space than others, and we would continue to leverage this space pre-eminence in our weapons, our enhanced intelligence, and the superior military decision-making enabled by superior space-supported information. An analogous posture between the U.S. and China already exists today in the strategic nuclear arena, where the U.S. is pre-eminent over China but China retains deterrent capabilities sufficient to its needs.

We Need a Better Understanding of Space Deterrence, Doctrine, and Stability

To date there has been almost no thoughtful discussion of what our national security space doctrine should be. Too often, space specialists have spoken about U.S. offensive space capabilities as if they were just one more weapon in the arsenal, to be used when military judgment deems best. In such discussions the word “deterrence” is rarely to be seen, and to my knowledge there is almost no work that has been done in this area.

Last year I was both heartened and disappointed to read an article on military space by General Tom Moorman, the retired Air Force Vice Chief of Staff, in which he stated:

“In addition to planning and programs, it is important to encourage a debate on space power to include development of a space deterrent theory. We need something similar to the intellectual ferment that surrounded nuclear deterrence.”

General Tom Moorman, Retired VCS, USAF
 “Military Space – Its Origins and Future,”
Aerospace America, March 2008, p. 29

General Moorman is right on the mark, further confirming the sad reality that this kind of thinking and planning has not taken place in the U.S. We must understand the new strategic landscape of space. How does deterrence in space work? What are its instability points? How do we “signal” the other side? What are tactical offensive counterspace’s risks of escalating into strategic conflict? How do third-party space assets complicate the strategic

space challenge in crisis or conflict situations? There has been little U.S. thinking on this “vital national interest” area – and that is worrisome. This is reminiscent of the early nuclear era, before modern deterrence theory was developed, when too many thought of nuclear weapons as just a bigger bang in the U.S. arsenal. Our much greater dependence on space, and advancing space technology, has changed everything except our way of thinking, so we are drifting into an increasingly unstable space environment.

Diplomacy and Arms Control

One important drawback of current U.S. space policy is its explicit rejection of space arms control. The U.S. literally was alone in the UN and elsewhere on space arms control issues, which eroded our international leadership in this area with our allies and allowed Russia and China to credibly mischaracterize our stance as provocative and hostile. The Bush administration was interested in voluntary steps on code of conduct, rules of road, and especially space debris, which was commendable but needed more emphasis than it received. My colleague Michael Krepon has done fine work on the code of conduct issue over the years; I highly recommend it to this Subcommittee and believe it offers a good early opportunity for U.S. diplomatic leadership in space.

The space dependence of our military power suggests we could gain from diplomatic attempts to limit space threats, yet we have done little. The choice was never arms control vs. unilateral programmatic and other steps to protect our space assets: we need both approaches, and more. Recall that the Reagan Administration was quite successful in its dual track strategy of combining military programs with arms control, and there is no reason to think such a strategy would not continue to be a useful guide to policy today. While diplomacy and arms control cannot by themselves solve our space security problems, they can help mitigate our risks. Our space arms control allergy should end, and U.S. diplomacy should have a stronger role in the future. 1996 U.S. space policy set two requirements for space arms control agreements that remain relevant today:

- They should promote U.S. security interests, and
- They should be verifiable

Interagency review of space diplomacy and arms control should be a priority of the Obama Administration. One option deserving special attention is a ban on any space testing that creates significant debris, explicitly including kinetic energy ASAT (KE-ASAT) weapons. A logical extension of concerns over space debris, this option would seek to discourage the development of KE-ASAT weapons by banning testing against orbiting objects. Carefully crafted language need not constrain missile defense testing.

Clearly more review of space arms control options is needed, but there is ample room to move forward, with broad civilian and commercial backing, in the areas of space traffic management and space debris. Such steps would be an affirmative U.S. response to China’s and Russia’s largely unrealistic space arms control proposals at the UN and would position us to take the lead in shaping a more responsible space regime. Further, by making realistic space arms control proposals, the U.S. would remove one of China’s arguments they have

used in the past to deflect action on a fissile materials cut-off treaty, which the U.S. has long supported but China opposes.

Observations and Conclusions

- We are entering a new era in space, and we do not understand the strategic landscape of space well at all. We can stumble into the future, or we can plan for it. Yet little thinking on the strategic landscape of space is underway.
- PLA writings make clear what China's diplomats don't: the PLA envisions conflict in space and is preparing for it. But PLA writings are not Chinese government policy.
- We can expect to see Russia playing a larger role in military space than in the past.
- Current U.S. space policy embodies a key contradiction: the reserved U.S. right to attack others in space conflicts with the stated belief that our space assets are a vital national interest. This only makes sense if:
 - U.S. could somehow successfully dominate space on a sustained basis; or
 - Right to attack others is anchored in a policy of deterrence, not war-fighting; or
 - Attacks are limited, tactical in nature (but can escalation be controlled?)
- A doctrine of space deterrence potentially offers the most benefit for U.S.
- The U.S. is unlikely to maintain the degree of space monopoly we have had to date. The issue is what kind of space regime we should seek that best serves U.S. security interests.

Recommendations

The United States needs to take important policy, programmatic, and diplomatic steps to protect and strengthen U.S. security interests in space, and accordingly should:

Policy

- Develop a space security strategy that emphasizes space stability and deterrence
- Develop/enunciate deterrence framework principles for U.S. counterspace policy and encourage public discussion of these issues
- Open up national space policy to allow/encourage negotiated agreements on the basis of U.S. national interest and verifiability
- Establish a Space Directorate within the National Security Council to address the many space security and other space issues that so strongly affect U.S. security

Programs

- Develop a layered suite of defensive capabilities commensurate with space's importance to U.S. military posture
- Enhance U.S. space situational awareness and space intelligence capabilities
- Develop if necessary selected capabilities in a deterrence context to negate adversary space capability that meet certain criteria in a deterrence context
- Diversify how we provide space information and services to reduce vulnerability
- Ensure our counterspace acquisition programs are driven by a coherent and sustainable space policy and doctrine – our programs should not drive policy

Diplomacy

- Consult with our allies to develop a united front on military space issues

- Build upon current U.S.-China military-to-military dialogue to see what can be accomplished in the space arena, and accord high foreign policy priority to this
- Give arms control an appropriate role in addressing space security
- Strengthen space dialogue on “rules of road” on a multilateral basis
- Seek a kinetic energy ASAT testing moratorium or ban
- Expand civil space cooperation with other space-faring nations